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April 7, 1983

CERTIFIED MAIL
RETURN RECEIPT
REQUESTED

Basil G. Constantelos, Director
Waste Management Division
United States Environmental
Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Request For Information Concerning Waste Disposal Practices at Johns-Manville Facility, Waukegan, Illinois

Dear Mr. Constantelos:

On behalf of Johns-Manville Sales Corporation, I enclose a response to your letter of February 7, 1983 requesting certain information concerning waste disposal practices at the facility in Waukegan, Illinois which is owned and operated by Johns-Manville Sales Corporation.

If you have any questions concerning the enclosed response or if you require any further information, please contact me directly, rather than the Waukegan facility or Johns-Manville's registered agent in Illinois, as I am representing Johns-Manville Sales Corporation in this matter.

Sincerely,

Carolyn A. Lown
Attorney for Johns-Manville
Sales Corporation

CAL/mab
Enclosure
cc: Mr. Norman Niedergang(w/encl.)
Helen L. Marsh, Esq. (w/encl.)

Johns-Manville
Sales Corporation

Waukegan, Illinois 60087
(312) 623-2900

April 7, 1983

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Basil G. Constantelos, Director
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United States Environmental
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Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Request For Information Concerning Waste Disposal Practices At Johns-Manville Facility, Waukegan, Illinois

Dear Mr. Constantelos:

By a February 7, 1983 letter, you requested certain information concerning waste disposal practices at the facility in Waukegan, Illinois which is owned and operated by Johns-Manville Sales Corporation ("Johns-Manville").

This information was requested pursuant to Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"), 42 U.S.C. §9604(e), and Section 3007 of the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. §6927. Both of these provisions, which require the furnishing of information, are very broad, but neither is unlimited. Section 3007(a) of RCRA requires any person who handles or has handled hazardous waste to "furnish information relating to such waste,"

42 U.S.C. §6927(a) (emphasis added), and Section 104(e) of CERCLA, in a similar fashion, specifies, among other things, that any person who handles or has handled hazardous substances shall "furnish information relating to such substances," 42 U.S.C. §9604(e)(1)(emphasis added).

Accordingly, information which concerns certain defined wastes or substances may be requested pursuant to these two statutory provisions. Your February 7, 1983 letter sought information concerning asbestos and "other hazardous substances" disposed at the Waukegan facility without defining the term "hazardous substances." Johns-Manville finds this to be ambiguous. In responding to your request, we are interpreting the term in a manner consistent with your statutory authority to request such information. Thus, we have taken your request concerning "other hazardous substances" to mean "hazardous substance" as defined by CERCLA, 42 U.S.C. §6901, which includes, among other things any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of RCRA, 42 U.S.C. §6921.

In addition to being ambiguous in its use of the term "hazardous substances", your February 7, 1983 request for information also is very broad. It calls for information covering a sixty year period of time during which whatever records were kept concerning waste disposal practices at the

Waukegan facility were subject to document retention policies of Johns-Manville and during which there have been a number of changes in the personnel who have knowledge concerning the methods of waste disposal. Consequently, Johns-Manville's response to your request is based upon a review and interpretation of those documents which presently are available and upon the personal recollections of a number of people.

Johns-Manville's response to your February 7, 1983 letter is set forth below. This response is provided without waiving any objections which Johns-Manville may have to the use of the information provided in any action or proceeding which may be commenced against it. Johns-Manville notes in particular with respect to this reservation of its rights that the Waukegan facility has been listed on the proposed National Priorities List, which is to become an Appendix B to the National Oil and Hazardous Substances Contingency Plan, 47 Fed. Reg. 58476 (Dec. 30, 1982). In proposing the National Priorities List, the United States Environmental Protection Agency ("USEPA") said that it "will begin considering various response and enforcement actions for the sites on the proposed NPL published today, prior to final promulgation of the NPL." 47 Fed. Reg. 58478 (Dec. 30, 1982).

Johns-Manville objects to such consideration by USEPA before interested persons have had an opportunity to

submit comments concerning the proposed National Priorities List and to have had these comments considered by USEPA. On February 28, 1983, Johns-Manville submitted to USEPA comprehensive comments regarding the listing of the Waukegan facility on the proposed National Priorities List.* In these comments, Johns-Manville demonstrated that the listing of the Waukegan facility was improper and that no remedial actions need to be undertaken at the site. Accordingly, Johns-Manville objects to any consideration by USEPA of response or enforcement actions against the Waukegan facility and to any use of the information provided in this response for such a purpose.

Request (a)

> A general description of the type and volume of asbestos waste and other hazardous substances which have been disposed at the Waukegan facility, including historical as well as present waste disposal rates;

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Response To Request (a)

The Waukegan facility was constructed beginning in 1919 and ending in 1923. The power house, paper mill, and

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* These comments were addressed to Russell H. Wyer; Director, Hazardous Site Control Division, Office of Emergency and Remedial Response, USEPA, Washington, D.C., and a copy was sent to Norman Niedergang, On-Scene Coordinator, USEPA, Region V. Johns-Manville will provide you with additional copies of these comments if you request.

roofing plant were put into operation in the fall of 1922 and the remainder of the plant was in operation by the end of 1923. The facility produced and continues to produce a variety of building materials comprised of a variety of substances. Initially, in the period 1922-1923, low temperature pipe coverings, packings, insulating cements, roofing products, asbestos and rag felt papers, and magnesia and asbestos shingles were made at the Waukegan facility. Since that time the facility has produced, among other things, aspnalt floor-tile, roofing felts, Sanacoustic Tile, Transite Pipe, cut gaskets, siding shingles, Flexboard, wallboard, clapboard, rock wool, and glass fiber sningles. In the process, waste has been generated, consisting of trim and rejects from the finished products manufactured and of raw materials somehow unused in the manufacturing process. Included among this waste were the substances asbestos, chrome, lead, xylene, and thiuram.

Almost all the waste generated since 1922 has been disposed at the facility's on-site disposal area, which consists of sections where dry waste has been deposited as well as of a recirculating, wet waste system, which is composed of a series of settling basins that do not discharge into navigable waters. See the response given to Request (f),below. During the period 1967 to 1971, some combustible waste

materials were incinerated rather than being sent to the on-site disposal area, and since 1967, efforts have been made to recycle waste materials whenever possible. For example, waste oils from the facility's HEAF units are burned in the facility's boilers, and waste engine, lubricating, and hydraulic oils are used as a dust suppressant on roads at the facility.

Given the long history of operation of the on-site disposal area and the lack of records, until recent years, which have been kept concerning the wastes disposed at this area, it is difficult to describe with precision the volume and rate of asbestos waste and other hazardous substances disposed at the Waukegan facility. Some general descriptions, however, may be given.

In April 1973, a survey was conducted of solid waste generated at the Waukegan facility. The survey considered wastes which previously had been generated but which for some reason had been discontinued and wastes which at that time were being disposed in the on-site disposal area. The results of the survey, which follow, recorded the estimated annual quantity of the waste as well as an estimate of the amount of asbestos contained in the waste.

APRIL 1973 SOLID WASTE SURVEY

Solid Wastes Previously Generated And Discontinued:

Product	Annual Quantity	Estimated Percent Asbestos	Status
Auto & Ind. Lining	130,000 lbs.	55%	Discontinue 4/30/73
Brake Blocks	315,000 lbs.	65%	Discontinued 2/1/73
No.6401 Brake Blocks	16,000 lbs.	39%	Discontinued 2/1/73
1257 Tan Brake Blocks	89,000 lbs.	65%	Discontinued 2/1/73
Friction Materials Sludge	32,000 lbs.	60%	Discontinue 5/1/73
#60 Service Sheet	838,000 lbs.	80%	Cut gasket discontinued 12/15/72; reject sheet sold at discount to gasket cutters.
#61 Service Sheet	200,000 lbs.	80%	Cut gasket discontinued 12/15/72; reject sheet sold at discount to gasket cutters.
Disc Brakes	Inc. in F.M. Sludge	60%	Discontinue 4/30/7[illegible]
Steel Back Clutch Facings	10,000 lbs.	60%	Discontinued 2/1/73
Transite Pipe	5,800,000 lbs. or 2,900 tons	15%	Recycled

Solid Wastes Disposed In April 1973:

Product	Annual Quantity	Estimated Percent Asbestos	Status
Millboard	25,000 lbs.	80%	No sheet material
Flexboard and Transitop	2,250,000 lbs.	22%	Trim, scrap and dust
Saturating Felt Roofing	5,472,000 lbs. or 2,736 tons	50%	No use found
Asphalt Roll Rfg.	13,344,000 lbs. or 6,672 tons	17%	1/3 asbestos felt 2/3 organic felt
Transite Pipe	8,748,000 lbs. or 4,373 tons dry	15%	Excess of recycle
	572,000 lbs. or 286 tons wet	15%	Wet end collector

In anticipation of filing the notification required by Section 3010 of RCRA, estimates of the quantities of hazardous waste, that prior to August 18, 1980 were identified under or listed pursuant to Section 3001 of RCRA, were made by Johns-Manville in August 1980:

EPA No.	Generic Name	Trade Name or Use	Monthly Quantity
F003	Xylene	Paint thinner	300 pounds
U013*	Raw Asbestos	Asbestos	750 pounds
D007	Chromium	Chromic oxide	14 pounds
D008	Lead	100B Lead	4 pounds
P117**	Thiuram	Methyl Tuads	1 pound plus 8 inner liners

It also was estimated at the time that the following quantities of hazardous waste were disposed in an encapsulated form, that is as the trim from or reject of a finished product:

Waste	Monthly Quantity
Asbestos	14,190 pounds
Tniuram	136 pounds
Lead	298 pounds
Cnromium	3,077 pounds

In addition, it was estimated that 17,410 pounds of waste asbestos per month was contained in the slurry going to the settling basins. However, with the shut down of tne Waukegan facility's papermill and asbestos felt line in September 1981,

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* On November 25, 1980, USEPA deferred final promulgation of the listing of asbestos as a hazardous waste listed pursuant to Section 3001 of RCRA. 45 Fed. Reg. 78538 (Nov. 25, 1980).

** On November 25, 1980, USEPA reclassified thiuram from an acute waste (P117), listed in 40 C.F.R. §261.33(e), to a hazardous waste (U244), listed in 40 C.F.R. §261.33(f). 45 Fed. Reg. 78534 (Nov.25, 1980)..

it further was estimated that the amount of waste asbestos contained in the slurry would be reduced by 9,000 pounds per month.

In the period which elapsed between filing the notification required by Section 3010 of RCRA and the filing of an application for a RCRA permit in November 1980*, the Waukegan facility was successful in reducing the quantity of hazardous waste disposed. Various manufacturing processes were modified so that asbestos which formerly would have been disposed as waste was reused to manufacture products. The quantity of xylene which became waste was reduced by instituting a recovery procedure whereby xylene which was contaminated by paint was collected, was allowed to settle, and then was siphoned off. The xylene remaining after this procedure was a relatively small quantity which adhered to the paint particles and was disposed. In November 1980, it

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* Because of the uncertainty surrounding the meaning of the regulations promulgated to implement RCRA, 40 C.F.R. Parts 260-265 (1983), and because the listing of asbestos as a hazardous waste was not deferred until November 25, 1980, Johns-Manville filed notification pursuant to Section 3010 of RCRA, as was required by August 18, 1980, and filed an application for a RCRA permit, as was required by November 19, 1980, for the Waukegan facility. Johns-Manville subsequently determined that the Waukegan facility did not constitute a RCRA facility and in a June 28, 1982 letter to Karl Klepitsch, Jr., Chief of the Waste Management Branch, USEPA, Region V, formally requested that its application for the RCRA permit be withdrawn.

was estimated that the quantity of waste xylene would be eight gallons per year or approximately 65 pounds.

Beginning in December 1980, monthly estimates have been made of the amounts of hazardous waste, as identified under or listed pursuant to Section 3001 of RCRA, and of raw asbestos* disposed of in the on-site disposal area.

MONTHLY ESTIMATES OF
HAZARDOUS WASTE AND RAW ASBESTOS
(in pounds)

Period	Raw Asbestos	D007** Chrome	D008** Lead	F003 Xylene	U244 Thiuram
1980:					
Dec.	54.9	22.5	--	--	--
1981:					
Jan.	17.8	--	--	--	--
Feb.	83.6	--	--	--	--

* On November 25, 1980, USEPA deferred "final promulgation of the listing [pursuant to Section 3001 of RCRA] of asbestos while we investigate further the relationship of the NESHAP [the national emission standard for asbestos which has been established in the National Emission Standards For Hazardous Air Pollutants, 40 C.F.R. Part 61, Subpart B (1982) (the "NESHAP for asbestos"), under Section 112 of the Clean Air Act, 42 U.S.C. §7412] and the RCRA management standards, and tne extent by which NESHAP facilities afford comparable environmental protection in managing waste asbestos." 45 Fed. Reg. 78538 (Nov. 25, 1980).

** The quantities of chrome and lead estimated are not those derived as a result of performing the test for EP toxicity prescribed in USEPA's RCRA regulations, 40 C.F.R. § 261.24 (1982). Ratner, these are gross quantities estimated to be contained in the waste disposed of on-site during the months indicated.

Period	Raw Asbestos	D007 Chrome	D008 Lead	F003 Xylene	U244 Thiuram
Mar.	27.6	26.4	--	--	--
Apr.	40.0	24.0	--	--	--
May	30.9	26.4	--	--	--
Jun.	36.9	4.4	--	--	--
Jul.	36.2	--	0.2	--	1.1
Aug.	33.2	--	3.8	--	--
Sep.	49.5	--	0.8	--	10.2
Oct.	137.9	1.6	1.0	--	61.0
Nov.	146.3	19.5	0.5	--	61.9
Dec.	101.8	19.5	0.3	--	43.7
1982: Jan.	152.1	--	1.0	--	80.0
Feb.	164.1	--	1.0	--	80.0
Mar.	171.1	--	1.0	--	91.7
Apr.	87.2	27.2	1.0	--	41.6
May	43.9	37.9	3.2	--	19.8
Jun.	63.2	--	1.0	--	19.0
Jul.	82.1	--	1.0	--	40.1
Aug.	124.8	--	2.0	--	65.2
Sep.	85.0	--	2.0	--	39.0
Oct.	72.6	--	2.3	--	33.0
Nov.	23.4	--	1.4	--	4.6
Dec.	21.8	--	1.1	--	3.5

Period	Raw Asbestos	D007 Chrome	D008 Lead	F003 Xylene	U244 Thiuram
1983:					
Jan.	23.4	--	--	--	--
Feb.	23.1	--	--	--	--

The monthly estimates given for raw asbestos are those of non-encapsulated fiber disposed of by the facility. Such fiber is placed in plastic bags, sealed, and labeled and is placed in the on-site disposal area where it is covered, within twenty-four hours, with at least six inches of compacted, non-asbestos-containing material. In addition to this waste asbestos, other asbestos (in the form of asbestos fibers which have been encapsulated into a cementitious or rubber matrix, those which have been added to a slurry going to the settling basins, and those contained in sludges dredged from the settling basins and placed in designated sections of the on-site disposal area) is disposed at the facility in a manner which complies with tnat required by the NESHAP for asbestos.

In reviewing these descriptions of the estimated volume and rate of asbestos and other hazardous substances disposed at the Waukegan facility's on-site disposal area, it must be noted that both the volume and type of waste disposed at the facility has changed over the years. This has occurred for a number of reasons. Because of changes in

posed at the facility has changed over the years. This has occurred for a number of reasons. Because of changes in product lines, the asbestos fiber used in manufacturing at the Waukegan facility in 1981 was 41.6% of that used in 1974 and in 1982 was 7.7% of 1974. The amount of asbestos disposed also has been reduced because of the facility's sucess in reusing a large amount of asbestos which previously was disposed as waste. Finally, the depressed condition of the economy in general and of the building materials industry in particular has caused the Waukegan facility to reduce its production, and hence the amount of waste created and then disposed.

Request (b)

> A description of the hazardous substance disposal methods which have previously been used at the facility;

Response To Request (b)

As has been noted in response to Request (a), almost all the wastes generated at the facility since 1922 have been disposed at the on-site disposal area.

Since the NESHAP for asbestos was promulgated,* Johns-Manville has undertaken to dispose of asbestos in accord-

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* The NESHAP for asbestos first was promulgated in 1973, 38 Fed. Reg. 8820 (April 6, 1973)(to be codified in 40 C.F.R. Part 61, Subpart B) and included emission standards for certain sources. In 1975, the NESHAP for asbestos was amended, inter alia, to address specifically waste disposal sites for asbestos, 40 Fed. Reg. 48292 (Oct. 14, 1975)(to be codified in 40 C.F.R. Part 61, Subpart B).

ance with these comprehensive federal regulations governing the disposition of asbestos-containing waste materials, so that either there were "no visible emissions to the outside air," 40 C.F.R. §61.25(a)(1982), or the asbestos waste was covered, within twenty-four hours, with at least six inches of compacted, non-asbestos-containing material, 40 C.F.R. §61.25(e)(1)(1982). It is not possible to determine from available records whether complete compliance with the NESHAP for asbestos always was achieved during this ten year period, although the on-site disposal area today is managed in accordance with tnese federal regulations.

Given the long history of operation of the on-site disposal area and tne lack of records, until recent years, concerning waste disposal operations, it is difficult to describe with precision methods of disposing of asbestos wastes prior to the promulgation of the NESHAP for asbestos. To a very large extent, such a description, in any event, should be irrelevant to any present assessment of "potential or actual health or environmental problems associated with waste disposal practices at the Johns-Manville facility," which you state in your February 7, 1983 letter is the purpose of USEPA's request for information.

Asbestos is an airborne contaminant, which is why it is regulated under Section 112 of the Clean Air Act, 42

U.S.C. §7412. Its migration through soil is, at most, minimal. USEPA in a 1977 report titled "Movement of Selected Metals, Asbestos, and Cyanide In Soil: Applications To Waste Disposal Problems" concluded that

> [s]ince the weathering products of asbestos are the common nonhazardous salts of Ca, Mg, and Si, physical transport is the only mode of movement in soil which is of significance. Tne extensive data on movement of clay-sized (2 u diameter) particles by strictly physical processes provide a convenient yardstick for gaging the probable behavior of asbestos in soil. Clay particles 0.1 to 2.0 u in diameter are estimated to move at a rate of 1 to 10 cm per 3,000 to 40,000 years, depending on tne soil texture (Berkland, 1974). There is no reason to expect that asbestos particles of similar sizes would move differently from this. Consequently, asbestos migration through soil will not be a problem of any significance.

Id. at 121. See preamble to NESHAP for asbestos, 38 Fed. Reg. 8822 (April 6, 1973) ("The contamination of ground water supplies with asbestos from landfill disposal is not considered a potential problem.").

Accordingly, the major concern in assessing any "potential or actual health or environmental problems" associated with the disposal of asbestos should be with whether these disposal practices have resulted in adequate control of the airborne transportation of asbestos. USEPA has examined what is required for such control when it promulgated the NESHAP for asbestos. The Clean Air Act mandates

that USEPA establish standards for hazardous air pollutants "at the level which in his judgment [the Administrator of USEPA] provides an ample margin of safety to protect the public health from such hazardous air pollutant." 42 U.S.C. 7412(b)(1)(B). In promulgating the NESHAP for asbestos, USEPA considered the ambient levels of asbestos as well as the goal of protecting public health and reached the following conclusions:

> It is probable that the effects of asbestos inhalation are cumulative: that is, low level and/or intermittent exposure to asbestos over a long time may be equally as important in the etiology of asbestotic disease as high level and/or continuous exposure over a shorter period. On the other hand, the available evidence does not indicate that levels of asbestos in most community air cause asbestotic disease. Taking both these considerations into account, the Administrator has determined that, in order to provide an ample margin of safety to protect the public health from asbestos, it is necessary to control emissions from major man-made sources of asbestos emissions into the atmosphere but that it is not necessary to prohibit all emissions.

38 Fed. Reg. 8820 (April 6, 1973).

The means taken by USEPA to implement these conclusions was to set an emission standard of "no visible emissions" coupled with certain prescribed operational practices.*

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* "The Agency [USEPA] recognizes that the best available disposal methods for some of the sources may not be capable of preventing visible emissions during a minor portion of

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40 C.F.R. Part 61, Subpart B (1982). The on-site disposal area at the Waukegan facility is managed in accordance with the NESHAP for asbestos: either there are "no visible emissions to the outside air," 40 C.F.R. §61.25(a) (1982) or the asbestos waste is covered, within twenty-four hours, with at least six incnes of compacted, non-asbestos-containing material, 40 C.F.R. §61.25(e)(1)(1982). This should control adequately any airborne transportation of asbestos from the on-site waste disposal area.

As has been noted, it is difficult to describe disposal methods which previously have been used at the Waukegan facility, and this is so with respect not only to the disposal of asbestos but also with respect to that of other hazardous substances. Certain hazardous substances which have been described in response to Request (a) have been disposed of in the on-site disposal area. Tneir present means of disposal are described in response to Request (c), below, and in the waste disposal plan for the Waukegan facility

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some of the disposal operations. Therefore, alternative methods of compliance that represent the best available disposal methods have been included in the regulations....For those alternative methods that may not be capable of preventing visible emissions during all portions of the waste disposal process, a requirement has nevertheless been included that there be no visible emissions from those portions of the process that can achieve this performance level." 40 Fed. Reg. 48296 (Oct. 14, 1975).

which is attached hereto and marked as "Attachment A" (the "Waukegan waste disposal plan"). The Waukegan waste disposal plan was proposed in August, 1981. Prior to that time, the methods used to dispose of the wastes described in the Waukegan waste disposal plan cannot be described with certainty. It can be stated, however, that the Waukegan facility has complied since November 19, 1981 with USEPA's ban on the disposal of containerized liquid-waste. See the October 5, 1981 Johns-Manville internal memorandum concerning the disposal of liquid waste, a copy of which is attached hereto and marked as "Attachment B." See also pages 7-8 of Attachment A.

Request (c)

> A description of the hazardous substance disposal methods currently being used at the facility;

Response to Request (c)

As has been described in response to Request (b), asbestos which is placed in the on-site disposal area is managed as required by the NESHAP for asbestos: either there are "no visible emissions to the outside air," 40 C.F.R. §61.25(a)(1982), or the asbestos waste is covered, within twenty-four hours, with at least six inches of compacted, non-asbestos-containing material, 40 C.F.R. 61.25(e)(1)(1982).

The disposal of other nazardous substances is described in the Waukegan waste disposal plan, which is Attachment A.

Request (d)

A description of any asbestos or other hazardous substance sampling and analysis programs which nave been conducted by Johns-Manville;

Response To Request (d)

Johns-Manville is uncertain as to what USEPA means by the phrase "sampling and analysis programs." Johns-Manville has engaged in no schedule or system of testing environmental levels of asbestos or other hazardous substances present at the on-site disposal area. It has, however, conducted analyses of the air sampling for asbestos which was undertaken at the on-site disposal area on April 28, 1982 by the Ecology and Environment Company, under contract to USEPA. These analyses are discussed in responsed to Request (g).

Johns-Manville also has conducted industrial hygiene surveys of employees engaged in the disposal of asbestos wastes at the Waukegan facility. These surveys might be characterized as being "sampling and analysis programs." However, these surveys examined occupational and not environmental exposures. In so doing, the industrial hygiene surveys evaluated the level of exposure to one actively involved in working with the substance in comparison to the Occupa-

tional Safety and Health Administration's ("OSHA") workplace standard for asbestos, 29 C.F.R. §1910.1001(b)(2) (1982) ("OSHA workplace standard").

As such, these surveys are not of use in evaluating the ambient levels of asbestos, which is an essential part of any assessment of the "potential or actual health or environmental problems associated with waste disposal practices" at the Waukegan facility, the stated purpose of USEPA's February 7, 1983 request for information. The OSHA workplace standard expresses a judgment concerning the permissible occupational exposure to asbestos. It is based on different assumptions and different judgments than is the standard for environmental exposure to asbestos which was developed by USEPA as the NESHAP for asbestos. Consequently, the occupational sampling results are not relevant to a determination of ambient levels.

The OSHA workplace standard is measured using a means of analysis prescribed by the OSHA regulations, 29 C.F.R. §1910.1001(e)(1982), which is different from and is not comparable to the analyses used most prevalently in analyzing environmental levels of asbestos. The OSHA workplace standard is to be measured using an optical microscope employing

the membrane filter method* while the commonly accepted means of analyzing environmental levels of asbestos is by use of electron microscopy**. Data from electron microscopy are not equivalent to data obtained by the membrane filter method, and it is not possible meaningfully to correlate the two, either as a general proposition or as an exercise in a specific situation unless there has been further detailed investigation to establish a correlation. The differences between the two methods and the reasons why no generally applicable correlation between the methods may be derived are described in detail in response to Request (g). Accordingly, data available from the industrial hygiene surveys, which are derived using the OSHA-prescribed methodology, are of essentially no use in determining levels of environmental exposure to asbestos.***

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* The measurement specified is that "made by the membrane filter method at 400-450X (magnification) (4 millimeter objective) with phase contrast illumination." 29 C.F.R. §1910.1001(e)(1982).

** This also was the method of analysis used with respect to the air sampling for asbestos conducted at the Waukegan facility's on-site disposal area on April 28, 1982, by the Ecology and Environment Company, as is discussed in response to Request (g).

*** While Johns-Manville believes that its industrial hygiene surveys are not relevant to this request by USEPA for information, Johns-Manville, nevertheless, states that its industrial hygiene surveys indicate that it is in compliance with the OSHA workplace standard, which prescribes the "8-hour

(Continued on next page)

Request (e)

A description of all analytical data which is available regarding asbestos or other hazardous substances;

Response To Request (e)

Tnis request for information is ambiguous and is so broad that Johns-Manville is unable to provide information in response. A literal interpretation of the request would

(Continued from previous page)

time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air," 29 C.F.R. §1910.1001(b)(2)(1982).

For example, less than tnree months after the Ecology and Environment Company conducted its air sampling for asbestos, Johns-Manville conducted, in July 1982, an industrial nygiene survey of the employees engaged in tne disposal of asbestos wastes at the Waukegan facility. In tnis survey, seven personal dust stations were establisned, and operators working at these stations were sampled to determine tneir occupational exposure to asbestos. Sampling was conducted on two different days to evaluate the effects of weather on the dust levels. The first day of sampling followed a neavy rain, the second day occurred after several dry days. In both instances, the day chosen was the same day on which bagged waste containing friable asbestos is taken to the on-site disposal area and buried.

Of the samples collected in this industrial hygiene survey, the largest amount measured occurred in only one sample and resulted in a time-weighted average ("TWA") of 0.2 fibers per cubic centimeter. That result was obtained from the bulldozer operator working on the "dry" day. The remaining TWA results all were 0.1 fibers per cubic centimeter or less. The results of these samples are attached hereto and marked as "Attachment C".

require the description of a vast number of publications and studies available to Johns-Manville which analyze asbestos and other hazardous substances as "all analytical data which is available" concerning such substances constitutes a very large universe of materials. To require such is unduly burdensome and seeks information which is not relevant to your February 7, 1983 inquiry. Accordingly, Johns-Manville is unable to respond to Request (e) as presently drafted. However, if USEPA is able to clarify this Request so as to make it more understandable and limited, Johns-Manville will cooperate with USEPA in attempting to furnish any reasonably requested information.

Request (f)

> A map or sketch showing past asbestos waste or other hazardous substance disposal locations, and existing locations where asbestos waste may be exposed to the atmosphere.

Response To Request (f)

A sketch showing the location of areas in which asbestos waste or other hazardous substances have been disposed is attached hereto and marked as "Attachment D". This sketch was prepared in 1981 to assist Johns-Manville in evaluating its waste disposal practices at the Waukegan facility and shows the general locations of the disposal of all waste, both hazardous and non-hazardous. That section of the sketch

marked "Asbestos Waste" indicates the portion of the on-site disposal area where asbestos waste which must be managed by covering, within twenty-four hours, with at least six inches of compacted, non-asbestos-containing material has been disposed since 1981. Asbestos waste which is managed in ways other than this, that is so there are "no visible emissions to the outside air," occurs throughout the on-site disposal area and is not limited just to the one section marked on Attachment D.

Johns-Manville does not understand how to interpret tne portion of the request which seeks the identification of locations where "asbestos waste may be exposed to the atmospnere" (emphasis added). Jonns-Manville cannot identify locations of such hypothetical exposure. It can only answer tnat the on-site disposal area at the Waukegan facility is managed as required by the NESHAP for asbestos: eitner there are "no visible emissions to the outside air," 40 C.F.R. §61.25(a) (1982), or the asbestos waste is covered, within twenty-four hours, with at least six inches of compacted, non-asbestos-containing material, 40 C.F.R. §61.25(e)(1)(1982).

Request (g)

Copies of all analytical data which shows levels of asbestos or other hazardous substances being released to the atmosphere from the waste disposal area. Data collected by the Illinois Institute of Technology Research Institute in 1973 and Ecology & Environment, Incorporated in 1982 need not be submitted.

Response To Request (g)

Although you have noted that we need not comment on data collected by the Illinois Institute of Technology Research Institute in 1973 and Ecology and Environment Incorporated in 1982, Johns-Manville, nevertheless, believes comment is necessary as Johns-Manville has analyzed these data and drawn conclusions concerning it.

USEPA provided Johns-Manville with the test results obtained from the air sampling for asbestos conducted at the Waukegan facility's on-site disposal area on April 28, 1982 by the Ecology and Environment Company, under contract to USEPA (the "USEPA Test Results"). The air sampling conducted yielded the following:

USEPA TEST RESULTS

Location and Type of Sample	Fibers/cubic centimeter*
Upwind:	
- coarse fibers**	0.70
- fine fibers***	0.02
Midsite:	
- coarse fibers	12.00
- fine fibers	0.20
Downwind:	
- coarse fibers	21.0
- fine fibers	below detection limit

Johns-Manville raises several questions concerning the significance of the USEPA Test Results.

First, there is some doubt about the means used to obtain the samples analyzed for the USEPA Test Results. Three Sierra Virtual Impactors were used for the testing. These are particulate samplers which are supposed to have the capability of discriminating between inhalable and non-inhalable particles and of classifying particles into two

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*Measured at 20,000X magnification using an electron microscope.

**Fibers ranging from 2.5u to 15u in size.

***Fibers smaller than 2.5u in size.

size ranges. Accordingly, particles larger than 15u in aerodynamic diameter were to be excluded from the samples collected and particles smaller than 15u were to be separated into two size fractions, one of the particles in the size 2.5u to 15u and the other of particles smaller than 2.5u.

It appears, nowever, that this intended separation did not occur. For example, the USEPA Test Results indicate tnat the largest single chrysotile fiber diameter counted in the downwind coarse sample was 0.7u* and the next largest had an aerodynamic diameter of 0.3u. The sampler which collected this was to have diverted fibers under 2.5u to the fine fraction filter. Obviously, the separation did not occur, suggesting that the sampling equipment malfunctioned or that the coarse and fine filters inadvertently were interchanged or mismarked.

If the filters were interchanged, then the fibers counted in the downwind coarse filter actually were fibers collected from the air sample drawn through the downwind fine filter. Tnis makes a crucial difference to the calculation of the concentration of asbestos fibers present in each sample. The number of asbestos fibers counted in the

---

* The diameter actually recorded was 14 millimeters. However, this measurement of 14 millimeters occurred at 20,000x magnification. Accordingly, the actual diameter of this fiber was 0.7u.

sample must be related proportionately to the volume of air drawn through each sample taken if a figure for concentration of fibers is to be derived. A different volume of air was passed through the coarse filter than through the fine filter. The downwind sampler channeled 6,800,000 cubic centimeters of air through the fine filter while it channeled 752,000 cubic centimeters of air through the coarse filter.

A total number of 250 cnryostile fibers were counted in the supposed coarse filter. The USEPA Test Results related these 250 fibers to 11.75 cubic centimeters of air, as this was the amount drawn through the actual coarse filter.* As a result, a concentration of 21 fibers per cubic centimeter (i.e. 250 fibers/11.75 cubic centimeters of air) was derived. If, however, the supposed coarse filter actually was the fine filter, then the number of chryostile fibers counted should have been related to a different volume of air, for approximately nine times the volume of air passed through

---

* The laboratory which analyzed the samples taken examined 2 grid sections (each 0.0075 square millimeters in size) of the downwind (coarse) filter. Thus, 0.00156% of the total area (960 square millimeters) of this coarse filter was examined. The grid sections examined were proportional to the air which passed through each filter. As 752,000 cubic centimeters of air in total was channeled through the entire coarse filter, then by examining 2 grids (or 0.00156%) of the entire coarse filter the chrysotile fibers present in 11.75 cubic centimeters of air (i.e. 0.00156% of 752,000) actually were counted.

the actual fine filter as went through the actual coarse filter. Accordingly, the 250 fibers of asbestos counted in the supposed coarse filter should have been related, on this assumption that the coarse and fine filters somehow were switched, to 106.25 cubic centimeters of air,* and a concentration of 2.35 fibers per cubic centimeter (i.e. 250 fibers/ 106.25 cubic centimeters of air) would have been estimated for the portion of the air passing through the filter labeled as the coarse filter. This result is 11% of that derived in the USEPA Test Results.

Second, it is only valid scientifically when considering ambient levels to have calculated the concentration value on the basis of a balanced composite sample. Furthermore, such a composite in this case would reduce the importance of whether or not the coarse and fine filters were interchanged. To derive a composite using the USEPA Test Results, the 250 chrysotile fibers counted in the supposed coarse filter sample and related to 11.75 cubic centimeters of air may be combined with the no detectible fibers associated

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* As noted, the grid sections examined were proportional to the air which passed through each filter and 2 grids (constituting 0.00156% total area) of the coarse filter were counted. Assuming 6,800,000 cubic centimeters of air (the amount which went to the fine filter) actually were filtered through the filter labeled as coarse, then the chrysotile fibers present in 106.25 cubic centimeters (i.e., 0.00156% of 6,800,000) really were counted.

with 106.25 cubic centimeters of air in the supposed fine fraction; when this is done, a composite value of 2.1 fibers per cubic centimeter (250 fibers/118 cubic centimeters of air) is derived. This value is one-tenth the size of the concentration derived for the downwind coarse filter in the USEPA Test Results.

Third, there is some doubt about the representativeness of the upwind coarse sample. Observers at the Waukegan facility on April 28, 1982 noted that this sample was damaged when removed from the sampler head, and a representative of the Ecology and Environment Company indicated that the upwind coarse sample would not be submitted for electron microscope analysis. Nevertheless, it was analyzed and included in the USEPA Test Results without any explanation of what effect this damage had on the sample results.

Fourth, there is some question concerning the precision and accuracy of results obtained through use of an electron microscope, which was the method used to analyze the samples taken. These problems of precision and accuracy are illustrated by comparing that method to the optical microscope method, or membrane filter method, which has been extensively used and analyzed, particularly for occupational monitoring at asbestos-using locations.

The membrane filter method was developed in Great Britain in the 1960s, and since that time it has been adopted by almost every industrialized country as the approved method for monitoring the workplace. In the United States, the Occupational Safety and Health Administration ("OSHA") has prescribed a workplace standard for asbestos emissions which is stated in terms of a numerical concentration that is to be measured in that manner "made by the membrane filter method at 400-450X (magnification (4 millimeter objective) with phase contrast illumination." 29 C.F.R. §1910.1001(e)(1982).

The membrane filter method as used officially in the United States has been developed by the National Institute for Occupational Safety and Health ("NIOSH"). The latest version of the method, which was issued in 1977, is referred to as Method No. P&CAM 239. The method has been studied in great detail in a number of laboratories so that there is a great deal of documentation available regarding both the precision and accuracy.

After a sample has been collected in the workplace and properly prepared for microscopic examination, the fibers are counted using phase contrast elimination at a magnification of approximately 450X. Depending on the quality of the microscope and the visual acuity of the observer, the

minimum diameter of fiber which can be observed by this method will be about 0.5 micrometers. Any fibers with smaller diameters, regardless of their length, will not be detected by this method. All agree that, even though all fibers present in the working environment are not detected, the method does provide a consistent index of worker exposure.

There are also very well-defined limits for the sensitivity of the membrane filter method. It is generally agreed that for the assessment of most workplace fiber concentrations, the method is reliable only for concentrations 0.5 fibers per cubic centimeter or greater. The detection limit for the method is generally considered to be 0.1 fiber per cubic centimeter: in other words, at that level it is possible to say that fibers are present but the concentration is such that they cannot be reliably quantified. In many cases, numbers smaller than 0.1 fiber per cubic centimeter are reported without qualification, but it must be remembered that they do not have any meaning whatsoever.

Because of the universality of the membrane filter method, it has been used, and most likely will continue to be used, as the primary method for assessing worker exposure for epidemiological and other health-related studies. There are occasional pressures to change to a method which is more sensitive. However, due to the difficulties in correlating

the results of one method with another, such a move would serve only to add considerable confusion to our existing epidemiological data base.

Due to the limitations of the membrane filter method and the low concentrations of asbestos fiber which exist in the general environment outside of the workplace, considerable effort has been devoted over the past decades to fiber analysis using the electron microscope. The transmission electron microscope has the advantage of having much superior resolution so that it can detect asbestos fibers with diameters as small as 0.025 micrometers (0.025 micrometers is the approximate diameter of the smallest chrysotile fibril known to exist). If the microscope is equipped with the proper ancillary equipment, it is also possible to conduct chemical analyses as well as to study the crystal structure of these minute particles. With such capability, it is possible to completely characterize the mineralogical nature of each of the fibers which is counted.

Even though the transmission electron microscope sounds like the ideal instrument for fiber analysis, it too suffers from several serious limitations. First of all, a fully equipped analytical transmission electron microscope will cost in excess of $500,000.00. This cost has limited the number of laboratories and of trained technicians able

to operate the instrument. The techniques used to prepare the sample for examination in the transmission electron microscope are also quite complex, and there are also very serious questions as to the loss of fibers and possible alteration of the sample during the procedure. In addition, the counting by this technique is rather slow and tedious, with the result that a technician can only handle about two samples per day without an excessive amount of fatigue.

Although the transmission electron microscope methodology has been under investigation for several years, there is very little reliable information available concerning the precision and accuracy. Some laboratories will report that they can reproduce results within a factor of two or three. If this is true, it only applies to ideal circumstances within a particular laboratory. Inter-laboratory studies where duplicate samples have been carried through the entire preparation and counting technique, have, in many cases, produced results which vary by as much as a factor of ten or more. The National Bureau of Standards, under contract from USEPA is currently in the process of preparing standard filters which can be used in an effort to obtain reliable inter-laboratory comparisons. They will also be very valuable for intra-laboratory precision studies. These samples should be available from the National Bureau of Standards sometime in

1983. It is only tnrough efforts such as these that we will begin to understand the wide variability in inter- and intra-laboratory results and so be able to attempt to solve the problem of variability.

The greatest problem which exists with electron microscope counting data is the lack of understanding of the true meaning of these counts. In all too many cases it is assumed that electron microscope counts are equivalent to counts obtained by the membrane filter method. This is not true -- the data cannot be used interchangeably. The mere fact that the electron microscope has the capability of detecting all of the fibers present, makes it impossible to assume that the results are comparable.

Data wnich are available in the literature vary from as much as a 2 to 1 ratio for the transmission electron microscope over optical to as high as a 1,000 to 1 ratio. See, e.g., Steel, Small, Sheridan, "Analytical Errors In Asbestos Analysis By Analytical Electron Microscopy" (National Bureau of Standards Special Publication 619, issued March 1982). Each of these numbers, plus a host of numbers in between, could very well be justified under a particular set of circumstances as a reasonable means of correlating the two. However, when a sample is obtained from the general environment where tne source cannot be characterized, it is

absolutely impossible to obtain a correlation between the transmission electron microscope and membrane filter results. The principle reasons for this are the fact that the optical counts are normally well below the applicable limits for the method and the completely unknown accuracy for the transmission electron microscope method.

Because of the many problems associated with the transmission electron microscope and other electron microscope methods, USEPA has yet to adopt a standard metnod for environmental fiber analysis, and this methodology most likely will not be available until such time as satisfactory answers to the precision and accuracy questions can be secured. In the interim, test results, such as the USEPA Test Results, obtained using electron microscopy must be viewed with some amount of skepticism, particularly insofar as attempts are made to relate them to possible health effects.

Regardless of these questions concerning the validity of the USEPA Test Results, the fact remains that these results do not indicate what the "background level" of asbestos is nor do they show that the level of asbestos emissions "significantly exceeds" background. The upwind sample used for the USEPA Test Results may not be taken as being the "background level" of asbestos. As has been discussed, there are too many questions concerning the method of sampling

employed, the most significant of which is that the upwind sample was damaged, for the single sample to be considered to be a "background level." Moreover, a comparison of the upwind sample to the downwind sample cannot lead to a statistically valid conclusion of "significant" difference with the variation that has been documented in other studies.

In addition to analyzing the USEPA Test Results in tnis fashion, Jonns-Manville is in tne process of furtner evaluating their conclusions by separately testing the portion provided to Johns-Manville of the air samples taken by the Ecology and Environment Company on April 28, 1982. Johns-Manville hopes to have the results of its testing within two weeks, at which time it will supplement this response to Request (g) to provide USEPA with its conclusions.

Request (g) also notes that data collected by the Illinois Institute of Technology Research Institute in 1973 need not be submitted. This 1973 testing data shows there was little difference in the concentration of asbestos fibers between testing locations upstream, downstream, and on the active face of the disposal area, indicating very little contribution from the disposal of asbestos. However, Johns-Manville must point out tnat, although the 1973 testing data probably were representative of the level of asbestos emissions present in 1973, it may not be representative of tne

level present in 1983. Because of changes in product lines, the asbestos fiber used in manufacturing at the Waukegan facility in 1981 was 41.6% of that in 1974 and that used in 1982 was 7.7% of that in 1974.

Request (h)

Copies of all analytical data which shows levels of asbestos or other hazardous substances in soils at the Jonns-Manville facility.

Response to Request (h)

Jonns-Manville is not aware of any such analytical data.

Notarization and Attestation

This document is signed by Richard B. Von Wald solely to satisfy USEPA's request for attestation. As previously stated, information relating to the sixty year production history of the Waukegan facility must necessarily be based in part on personal recollections of many people and a review and interpretation of available documents. No one person has personal knowledge and information necessary for preparation of this response. Johns-Manville does represent that the information contained herein is correct to the best of its current knowledge, information, and belief. Johns-Manville reserves the right to supplement this response should new or different information become available.

Sincerely,

JOHNS-MANVILLE SALES CORPORATION

By _____
Richard B. Von Wald
Corporate Counsel

cc: Mr. Norman Niedergang
On-Scene Coordinator
United States Environmental
Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Johns-Manville

Internal Correspondence

To: See end of correspondence

Date: June 10, 1982

From: J. H. Scott/W. E. Van Dyke JHS/WEVD

Copies: See end of correspondence

Subject: WASTE DISPOSAL PLAN - WAUKEGAN PLANTS

Attached is an updated Waste Disposal plan. All employees should be made aware of the proper method of disposing of any waste material.

Please set up meetings, such as your regular safety meetings, to disseminate the Waste Disposal plan to your employees. Name of employees attending should be sent to the Safety Co-ordinator for filing.

To:
P. J. Niccolai - 44
J. T. Ryan - 55
J. C. Clark - 54
L. D. Mutaw - 69
J. J. Zavasky - 48
J. W. Szcygielski - 81
L. H. Wilcox - 88

cc:
E. A. Paddock - 91
D. R. Walker - 56
F. P. LoMonaco WHQ 2-02
R. Jonas - 56
R. E. Gatti - 26
J. Link - 26
G. Tyson - 102
SL-3

ATTACHMENT A

WASTE DISPOSAL PLAN

WAUKEGAN PLANTS

The U. S. Federal authorities, and many state agencies, have developed and adopted a broad range of complex regulations which are designed to protect our environment. The U. S. Environemental Protection Agency, in concert with participating state agencies, recently have instituted very strict requirements governing the disposal of hazardous chemicals and waste materials from manufacturing processes. Government officials have listed many materials used in industry that must be handled or disposed of with extreme caution. Some of these materials we have used for many years and they include such common liquids as gasoline, solvents and acids. These regulations apply to both small and large quantities of waste materials.

Because of these regulations, effective immediately no Johns-Manville employee is to dispose of any plant waste material unless plant regulations for disposing of waste material are strictly adhered to. The Waukegan Plant procedures for waste material disposal are attached.

Failure to follow plant rules for waste disposal will result in disciplinary action against an employee. If there are any questions regarding proper disposal methods, the employee's supervisor should be contacted.

WASTE DISPOSAL PLAN

WAUKEGAN PLANTS

The RCRA listing of hazardous wastes is very extensive. Most of the items are not used at the Waukegan Plants. Those items that are present at this location and their proper disposal, are outlined below. It is imperative that these items are disposed of properly, and the quantities involved are documented.

I. HAZARDOUS WASTES

A. Asbestos - Where possible, raw asbestos waste should be reused in the process.

1) Asbestos Fiber Bags

After asbestos fiber has been dumped, the bag will be placed in a large plastic bag. When the large bag is filled, it will be closed, sealed, tagged with a "caution-asbestos" tag and set aside on the scrap dock. It will be picked up by the scrap truck and deposited in our asbestos dump area. Within 24 hours, the bags will be covered with at least 6 inches of compacted non-asbestos material.

2) Dry Asbestos Waste from Vacuum Cleaning

Waste will be placed in a plastic bag and disposed of as in (1) above. Quantity must be recorded. This includes the Hoffman vacuum system in the Roofing Department.

3) Floor Sweepings

Floor sweepings that might contain asbestos fibers will be dumped into the recirculating water system where they will be carried to the settling basin.

4) Dusthouse Dust

Dusthouse dust containing asbestos must be bagged and disposed of in the asbestos dump. Accurate weight records must be kept and reported on the hazardous waste report.

B. (U-239)

Xylene - Not to be disposed of in its natural state.

1. Empty drums will be cleaned and sold.

2. Paint sludge containing minimal amounts of Xylene is to be accumulated in drums and dispostion requested from the Safety Co-ordinator.

C. (D-001)

Birch White Primer Paint

Empty drums are cleaned and sold.

D. (U-154)

Methanol

Not to be disposed of in its natural state.

E. (U-220)

Solvents, Naptha, Toluene

Should not be disposed of in the natural state. A sheeter stock that is not usable should be disposed of in the hazardous waste area as asbestos and records kept as to amount.

F. (U-244)

Methal Tuads - Thiuram

Drum liners and/or drums must be disposed of in the same manner as asbestos bags.

1. Drums with no liners are to be crushed and disposed of in plastic bags.

2. Drums with liners, liners are to be put in plastic bags and disposed of in the asbestos waste dump.

3. Dusthouse dust is to be bagged and disposed of in the asbestos dump.

Records of all weights of all wastes must be reported on the hazardous waste form.

G. (D-007)

Chrome Oxide

Empty bags are to be placed in large plastic bags and disposed of in same manner as asbestos bags.

Floor sweepings and vacuum cleaner dust when possible should be used and not disposed of in the dump.

If material is disposed of that cannot be used, it must be weighed, put in plastic bags, and buried in the asbestos waste dump.

Accurate records must be kept and weights reported monthly on the hazardous waste reporting form.

H. (D-008)

Lead

Containers should be bagged and disposed of in the asbestos waste dump. Spills and floor sweepings must, when possible, be reused in the process.

If spills cannot be used, they must be accurately estimated, bagged and disposed of in the asbestos dump.

Dusthouse dust containing lead must be weighed, lead quantity estimated and disposed of in the same manner as asbestos.

In all instances, accurate weight records must be kept and reported on the hazardous waste form monthly.

I. Paint Shop Products

Most of these products have a flash point of 140 degrees F. or less and are therefore ignitable and a hazardous waste. Material will be disposed of as follows:

1. Paint Shop material in damaged containers. This is to be collected in the Paint Shop and re-packaged, or else sold as "seconds" to employees. A quantity of labels are to be obtained for Black Line products that we purchase.

2. Off specification Paint Shop products. Supervision will enforce the policy that no containers are to be filled until the batch passes testing. This will reduce the off spec quantity to a minimum. Off specification material that is generated will be re-used in batches or sold as "seconds" to employees.

3. Clean out batches. It becomes necessary to clean out the mixer before mixing certain products so as not to contaminate the new products. Clean out is normally done by putting cutback and oleum in the mixer and running the mixer for a period of time. The clean out batch must then be disposed of.

   a) Planning and Scheduling will establish a production schedule to reduce clean out batches to a minimum. This should include sequencing of products, as well as scheduling longer runs of Insulkote.

   b) Clean out batches that can be reused in a product requiring cutback and oleum will be saved and reused.

   c) Clean out batches or other Paint Shop material that cannot be reused will be rendered non-hazardous (flash point will be raised to above 140 degrees F.). Quality Control will tag these containers as non-hazardous, and they can be disposed of in our dump. If the material is still a liquid it should be poured out of the container and the container crushed.

J. Any waste which exhibits any of the following characteristics is a hazardous waste and is not to be disposed of without supervision. Type of waste, quantity involved, and method of disposal must be documented.

1. Corrosive

a) Any liquid with a pH of 2.0 or under or 12.5 and over.

b) Includes most acids used for cleaning, etc.

2. Ignitable

a) Any liquid or solid with a flash point of less than 140 degrees F.

b) Any ignitable compressed gas.

c) Not a liquid but capable of causing fire through friction, absorption or chemical change.

d) It is an oxidizer.

e) Includes kerosene, mineral spirits, oleum, gasoline, etc.

3. Reactive

a) An explosive or capable of detonating, or undergoes violent chemical change when exposed to air or water.

b) Generates toxic or flammable gases, or fumes, when exposed to air, water, acid or alkaline material.

4. Infectious

Waste contaminated with microorganisms.

5. Toxic

Waste that exhibits the characteristics of EP (extraction procedure) toxicity when subjected to the proper test and contains any of the contaminants listed in Table I of Paragraph #261.24 of the regulations.

K. Other items, such as most laboratory chemicals, pesticides, etc., are hazardous wastes and should only be disposed of under supervision.

II. DISPOSAL OF LIQUID WASTE

On November 19, 1981, the Federal Government banned the disposal of any containerized liquid waste even though non-toxic. Section 265.314 RCRA. Containers should not be left intact on the dump; rather they should be crushed.

Following is a method to follow so that all liquid wastes will be handled uniformly at the Waukegan location.

A. Any oils, hydraulic fluids, etc., should be put in drums. The drums labeled as to what kind of fluid is contained in the drum. Salvage then should be called at Extension 234. They will immediately pick up the drums of oil and store them for use in oiling the plant roads. Waste oil from the Truck Shop is handled in this manner.

B. If large quantities of oils are to be disposed of, it may be sold to waste oil processors. This must be done through Purchasing.

   All containers of oils must be identified and tagged before any processor will pick them up. Illinois hazardous waste manifests may be required for shipping. Traffic should be notified.

C. HEAF reclaim oil is deposited in the Power House oil storage tank.

D. Any other liquids that are disposed of must be handled on their own.

   1. The contents must be determined and drums labeled.

   2. If it is not known, the material must be tested. This can be done in-plant or at an outside testing facility. After testing, disposition must be requested from the Safety Co-ordinator.

   3. It should be noted that any ignitable (flash point of 140 degrees F. or below) or reactive waste must be treated and rendered non-hazardous before disposal. Before treating waste contact the Safety Co-ordinator. Treating or changing hazardous waste may require registration of our location as a waste treatment location, and require special permits.

E. Under no circumstances are any PCB oils to be disposed of without prior approval of HS&E in Denver.

F. Spills will be disposed of as follows:

1. Gasoline, methanol, oleum, mineral spirits, kerosene, etc. Small quantities of up to five gallons, when spilled inside the plant, will be treated with oil dry sand, or other material to soak up the ignitable liquid. Material will be collected in a container and disposition requested.

2. Asphalts, coatings, etc. (flash point above 140 degrees F.) will be allowed to cool, cleaned up, placed in a container and deposited in our dump area.

III. NON-HAZARDOUS MATERIAL DISPOSITION

A. Material cleaned out of the stills, saturators, asphalt tanks, etc., will be collected and deposited in our dump area.

B. All other scrap materials, such as broken pallets, paper, non-hazardous raw materials, in-process materials and finished goods will be collected in scrap carts and deposited in our dump area.

C. Scrap fiber glass felt will be placed in ROURA hoppers, dumped into the baler, baled and deposited in our dump area.

D. Scrap asbestos paper or organic paper will be disposed of to the best interests of Johns-Manville.

E. Encapsulated material from the ABALLO unit in Mineral Panels will be disposed of in the Asbestos waste area and covered within 24 hours.

F. Knock outs from #4 and #5 Roofing machines will be collected in bags and placed in scrap carts for disposal in our dump area.

G. Scrap R. F. will be placed in scrap carts for disposal on our dump.

H. Scrap T-12 will be accumulated in ROURA hoppers and disposed of in our dump.

I. Scrap sheeter material will be disposed of on our dump.

J. Scrap lime alumina, silica, etc., from the bulk handling system for "B" building will be collected by Yards Maintenance and disposed of on our dump.

IV. DOCUMENTATION

An accurate record must be kept of the type and quantity of hazardous waste deposited on our dump monthly. See "Hazardous Waste Disposal" form attached.

An accurate accounting of special wastes deposited on our dump must also be made. See "Special Waste Disposal" form attached.

HAZARDOUS WASTE DISPOSAL

DEPT. _____ MONTH AND YEAR _____

DATE	HAZARDOUS WASTE	QUANTITY IN LBS.

SPECIAL WASTE DISPOSAL (Revised 3/9/82)

TO: Environmental Control Coordinator

FROM: _____ DATE: _____

TYPE OF WASTE	QUANTITY	RENDERED NON-HAZARDOUS	HOW DISPOSED
PAINT SHOP PRODUCTS			
OILS			
PAINT SLUDGE			
OTHER, ITEMIZE			

REMEMBER: NO CONTAINERIZED LIQUIDS ARE ALLOWED IN OUR DUMP. WHEN DISPOSAL IS REQUIRED, THE LIQUID IS TO BE POURED OUT OF DRUMS, THE DRUMS CRUSHED AND BURIED.

Johns-Manville

Internal Correspondence

To: See end of correspondence: Date: October 5, 1981

From: J. H. Scott/W. E. Van Dyke

Copies: E. A. Paddock - 91 L. H. Wilcox - 88 FL-2
D. Walker - 56 J. W. Szcygielski - 81 SL-2

Subject: DISPOSAL OF LIQUID WASTE
R. E. GATTI'S LETTER 9-23-81

Attached letter describes the accepted disposal methods for certain liquids. Please comply.

To:
P. J. Niccolai - 44
J. C. Clark - 54
J. T. Ryan - 55 (5)
J. J. Zavasky - 48
L. D. Mutaw - 69
P. J. Dziak - 54

ATTACHMENT B

Johns-Manville

Internal Correspondence

To: See End of Correspondence

Date: September 23, 1981

From: R. E. Gatti/J. E. Link REG

Copies: File/Ch.

Subject: DISPOSAL OF LIQUID WASTE

A recent directive from HS&E states that no liquid waste, unidentified, will be disposed of in drums or any container.

On November 19, 1981, the Federal government bans the disposa of any containerized liquid waste even though non-toxic. Section 265.314 RCRA.

Following is a method to follow so that all liquid wastes wil be handled uniformly at the Waukegan location.

1) Any oils, hydraulic fluids, etc. should be put in drums. The drums labeled as to what kind of fluid is contained in the drum. Salvage then should be called at ext. 234. They will immediately pick up the drums of oil and store them for use in oiling the plant roads.

2) If large quantities of oils are to be disposed of, it can be sold to waste oil processors. This must be done through Purchasing.

   All containers of oils must be identified and tagged before any processor will pick them up.

3) Any other liquids that are disposed of in drums must be handled on their own.

   A) The contents must be determined and drums labeled.

   B) If it is not known, the material must be tested. This can be done in-plant or at an outside testing facility. Contact Joe Link for assistance if necessary, who in turn will contact the proper authorities in HS&E in Denver.

C) It should be noted that any ignitable (flashpoint of 140°F or below) or reactive waste must be treated and rendered non-hazardous before disposal. Before wastes are treated, HS&E in Denver must be contacted because treating or changing hazardous waste would require registration of our location as a waste treatment location and would require special permits.

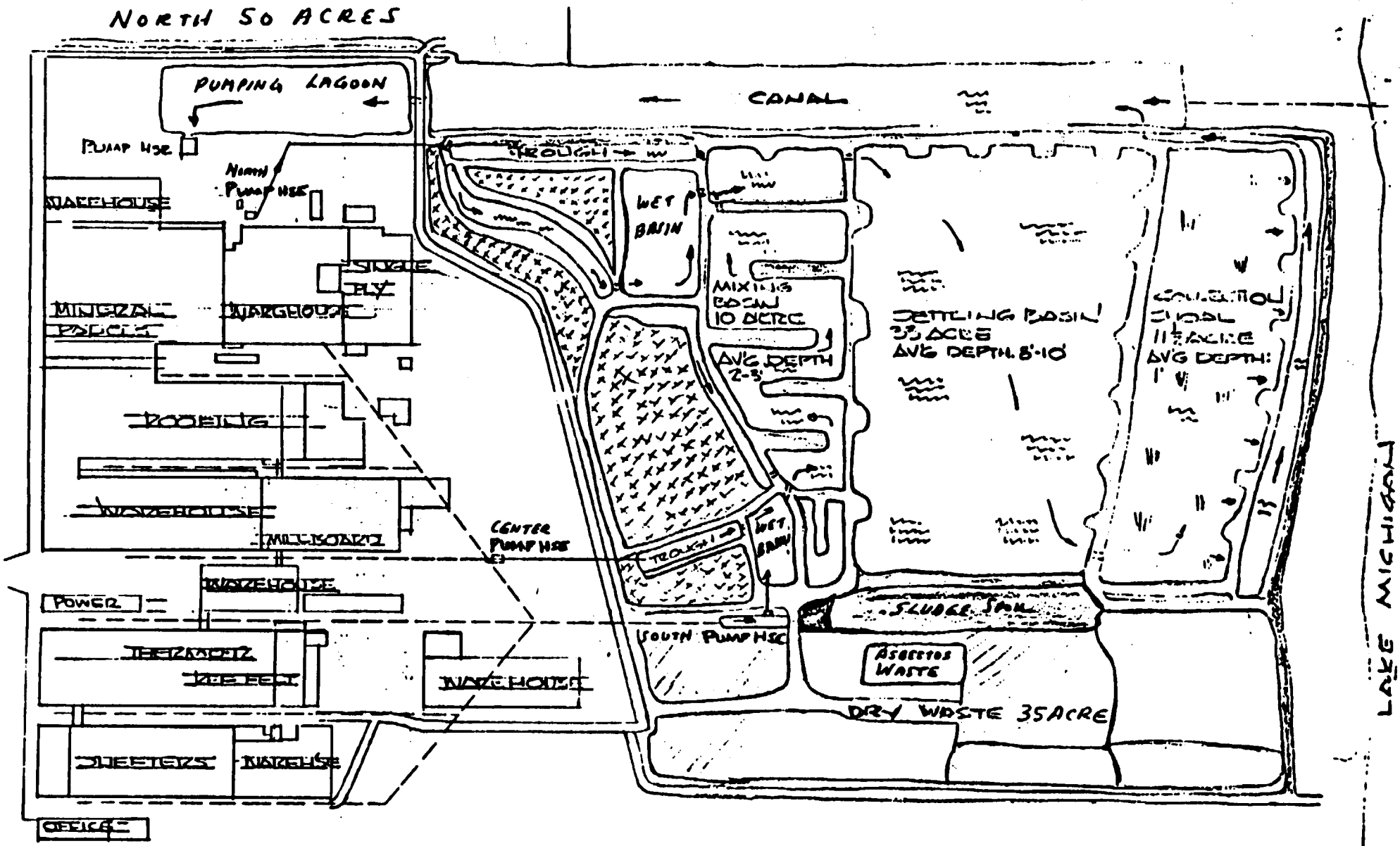
4) Under no circumstances are any PCB oils to be disposed of without prior approval of HS&E in Denver.

E. C. Bandovich
R. B. Mikuska
T. R. Mann
R. Smith, Jr.
J. J. Pickering
G. P. Wilkins
E. T. Parks

INDUSTRIAL HYGIENE SURVEY CONDUCTED AT
WAUKEGAN FACILITY DURING JULY 7-14, 1982

Station	Description/Hazard	TLV*	Results
0101YM	Personal-Section Leader		
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
0102YM	Personal-Yard, Sewer & Track Leader		DID NOT OPERATE
0103YM	Personal-Maintenance		DID NOT OPERATE
0104YM	Personal-Back Hoe Operator		
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
0105YM	Personal-Bulldozer Operator		
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
0106YM	Personal-Scrap Disposal Truck Driver		
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
0107YM	Personal-Mud Truck Driver		
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC
	/Asbestos	2.0	0.1 F/CC

*"TLV" means the threshold limit value, which is the fiber level permitted by OSHA in the workplace. The OSHA workplace standard for asbestos specifies that the "8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air." 29 C.F.R. §1910.1001 (b)(2) (1982).



MANUFACTURING SEWER LINES & WET-DRY WASTE DISPOSAL AREAS

DRAWN WB	DATE 9-25-81	JOHNS-MANVILLE PUTNAM, IL	DWG 5L7715

ATTACHMENT D

TABLE I

Summary of Data Received from U.S. EPA

IDENTITY OF TESTING LOCATION	UPWIND		MIDSITE		DOWNWIND	
	FINE	COARSE	FINE	COARSE	FINE	COARSE
Reported detection limit (fibers/mm^2)	15	15	21	150	6.8	150
Air filtered (m^3)	6.15	0.685	6.75	0.752	6.8	0.752
Filter area (mm^2)	960	960	960	960	960	960
Fields examined	20	20	14	2	20	2
Field area (mm^2)	.0075	.0075	.0075	.0075	.0075	.0075
Resultant air aliquot examined (cc)	961	107	738	12	1062	12
Total chrysotile fibers counted	17	73	119	144	0	250
Chrysotile concentrations calc. fibers/cc	0.02	0.7	0.2	12	BDL	21
calc. mass (ng/m^3)	0.9	38	270	450	BDL	1900

TABLE II

SUMMARY OF ESTIMATED FIBERS[1] AND MASS[2]
FOR TOTAL FILTER AREA REPORTED BY TEM LAB

Sample No.	No. of Chrysotile Fibers (Total Filter Area)	No. of Crocidolite Fibers (Total Filter Area)	No. of Clumps (Total Filter Area)	No. of Bundles (Total Filter Area)	Mass of Chrysotile Fibers & Bundles (Total Filter Area)	Mass of Crocidolite Fibers[3] (Total Filter Area)	No. of Grids Counted
W-1-3 Upwind Fine	1.67×10^5 [2.43×10^5, 9.03×10^4]	-	8.78×10^3 [2.63×10^4, 0]	-	0.0651 ng	-	10
W-2-3 Midsite Coarse	1.84×10^6 [2.41×10^6, 1.27×10^6]	4.39×10^4 [1.32×10^5, 0]	1.27×10^6 [1.75×10^6, 8.00×10^5]	3.51×10^5 [5.99×10^5, 1.03×10^5]	1196 ng	50.50 ng	2
W-3-3 Midsite Fine	3.42×10^5 [4.52×10^5, 2.33×10^5]	-	1.93×10^5 [2.75×10^5, 1.11×10^5]	6.14×10^4 [1.08×10^5, 1.50×10^4]	6.210 ng	-	10
W-4-3 Downwind Coarse	2.914×10^6 [2.461×10^6, 3.366×10^6]	1.58×10^5 [5.27×10^4, 2.63×10^5]	1.21×10^6 [9.20×10^5, 1.50×10^6]	5.44×10^5 [3.49×10^5, 7.40×10^5]	133.23 ng	48.99 ng	5
W-5-3 Downwind Fine	1.14×10^5 [1.77×10^5, 5.08×10^4]	-	1.76×10^5 [2.54×10^5, 9.70×10^5]	5.27×10^4 [9.57×10^4, 9.66×10^3]	2.457 ng	-	10
Blank	9.67×10^3 [2.91×10^4, 0]	-	-	-	0.00131 ng	-	10

[1]The summary of the fibers & bundles gives the quantity to relate to the total fibers reported by EPA (upper & lower 95% confidence limit based only on Poisson variation, which underestimates true confidence limits, are given in brackets)

[2]Mass of clumps not included. (By definition the mass cannot be estimated in clumps)

[3]No bundle determined.

TABLE III

Summary of U.S. EPA and Johns-Manville TEM Fibers/Cubic Centimeter Test Results for split samples taken by the Ecology and Environment Company on April 18, 1982.

Location and Type of Sample	Fibers/Cubic Centimeter			
	Individual Filters*		Ambient*	
	U.S. EPA	J-M	U.S. EPA	J-M
Upwind:				
-- 'Coarse'	.70	**	.11	**
-- 'Fine'	.02	.03		
idsite:				
-- 'Coarse'	12.0	3.00	1.4	0.4
-- 'Fine'	0.20	0.09		
Downwind:				
-- 'Coarse'	21.0	4.8	2.1	0.5
-- 'Fine'	Below detection limit	.05		

Individual filter results must be combined using weights proportioned to the air drawn through the filter to give the ambient level estimates.

**No data - a portion of the filter was not provided to Johns-Manville because it was damaged at the time the sample was taken.

TABLE IV

Summary of U.S. EPA and Johns-Manville TEM Mass Test Results for split samples taken by Ecology and Environment Company on April 28, 1982.

Location and Type of Sample	Nanograms/Cubic Centimeter			
	Individual Filters*		Ambient*	
	U.S. EPA	J-M	U.S. EPA	J-M
Upwind:				
-- 'Coarse'	38	**	5	**
-- 'Fine'	0.9	0.01		
Midsite:				
-- 'Coarse'	450	1658	288	167
-- 'Fine'	270	0.9		
Downwind:				
-- 'Coarse'	1900	242	189	24
-- 'Fine'	Below detection limit	0.4		

*Individual filter results must be combined using weights proportional to the air drawn through the filter to give the ambient level estimates.

**No data - a portion of the filter was not provided to Johns-Manville because it was damaged at the time the sample was taken.

APPENDIX A

Printouts From

Johns-Manville TEM Laboratory

chrysotile

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND ACTUAL MASSES

WAUKEGAN LANDFILL W-1-3 D=2.55 MAG=48000.0

TABLE 1 19 OBSERVATIONS PAGE 1

FIBER NUMBER	DIAMETER (MICRONS)	LENGTH (MICRONS)
14	0.016	0.166
19	0.016	0.166
8	0.016	0.187
9	0.016	0.187
12	0.016	0.187
7	0.016	1.458
11	0.020	0.104
15	0.020	0.125
2	0.020	0.166
1	0.020	0.187
10	0.020	0.187
3	0.020	0.208
16	0.020	0.229
17	0.020	0.270
6	0.020	0.729
13	0.031	0.208
5	0.031	0.312
18	0.041	0.250
4	0.072	0.250

STATISTICS SUMMARY

WAUKEGA([illegible] OFILL W-1-3 D=2.55 MA(18 0.0

	DIAMETER (MICRONS)	LENGTH (MICRONS)
OBSERVATIONS	19	19
AVERAGE	0.024	0.294
GEOMETRIC MEAN	0.022	0.231
MEDIAN	0.020	0.187
STANDARD DEVIATION	0.013	0.311
MINIMUM	0.016	0.104
MAXIMUM	0.072	1.458

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND AEROSOL MASSES

WAUKEGAN LANDFILL W-1-3 D=2.55 MAG=48000.0

TABLE 3 * 19 OBSERVATIONS PAGE 1

Chrysotile W-1-3

9)	1.329836171-07	***
8)	1.496068457-07	***
10)	1.498066457-07	***
3)	1.666366744-07	***
16)	1.834533030-07	***
17)	2.168986542-07	***
4)	5.840063665-07	***
15)	4.003287537-07	***
5)	6.004931306-07	***
11)	8.416621247-07	***
14)	8.510951452-08	***
18)	8.510951452-08	***
6)	9.587638127-08	***
2)	9.587638127-08	***
12)	9.587638127-08	***
7)	7.475261492-07	***
11)	8.331503716-08	***
13)	1.001382659-07	***
19)	2.595595851-06	***
avg.	3.899938523-07	***
std.d	5.871856816-07	***
min	8.51-08	
max	2.6-06	
total	7.409883194-06	***
total on filter	.0651	ng.

* All data in ng.

chrysotile

FIBER COUNT DATA

RELATIONSHI(O DIAMETERS, LENGTHS, A UAL MASSES

WAUKEGAN LANDFILL W-2-3 D=2.55 MAG=48000.0

TABLE 1 50 OBSERVATIONS PAGE 1

FIBER NUMBER	DIAMETER (MICRONS)	LENGTH (MICRONS)
5	0.016	0.208
33	0.016	1.250
37	0.016	1.666
4	0.020	0.250
21	0.020	0.312
2	0.020	0.416
48	0.020	0.625
9	0.020	0.833
31	0.020	0.833
47	0.020	1.041
44	0.020	1.145
23	0.020	1.250
26	0.020	1.875
45	0.020	1.875
20	0.031	2.083
22	0.037	0.625
1	0.037	1.250
8	0.041	0.208
27	0.041	0.375
39	0.041	0.416
24	0.041	0.729
3	0.041	0.833
17	0.041	0.833
42	0.041	0.833
29	0.041	1.041
15	0.041	1.250
30	0.041	1.250
35	0.041	1.250
32	0.041	1.458
34	0.041	1.666
43	0.041	1.666
38	0.041	1.875
41	0.041	2.083
40	0.041	2.500
50	0.041	2.916
25	0.041	3.125
7	0.041	4.062
18	0.041	4.375
6	0.041	4.479
28	0.041	5.625
19	0.052	0.375
36	0.062	2.500
46	0.062	3.333
13	0.072	0.625
14	0.083	1.041
49	0.104	4.791
10	0.145	1.041
16	0.145	1.666

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND ACTUAL MASSES

WAUKEGAN LANDFILL W-2-3 D=2.55 MAG=48000.0

TABLE 1 50 OBSERVATIONS PAGE 2

FIBER NUMBER	DIAMETER (MICRONS)	LENGTH (MICRONS)
12	0.416	9.583
11	1.250	7.500

STATISTICS SUMMARY

WAUKEG(L DFILL W-2-3 D=2.55 M(4 30.0

	DIAMETER (MICRONS)	LENGTH (MICRONS)
OBSERVATIONS	50	50
AVERAGE	0.075	1.897
GEOMETRIC MEAN	0.042	1.286
MEDIAN	0.041	1.250
STANDARD DEVIATION	0.180	1.884
MINIMUM	0.016	0.208
MAXIMUM	1.250	9.583

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND ACTUAL MASSES

WAUKEGAN LANDFILL W-2-3 D=2.55 MAG=48000.0

TABLE 3 50 OBSERVATIONS PAGE 1

Chrysotile

5)	1.066432476-07	***
33)	6.408849016-07	***
37)	6.541713969-07	***
4)	2.002765317-07	***
21)	2.499451115-07	***
2)	3.332601487-07	***
40)	5.006813293-07	***
9)	6.673214037-07	***
31)	6.673214037-07	***
47)	8.339514780-07	***
44)	9.172665152-07	***
23)	1.001332655-06	***
24)	1.502073995-06	***
45)	1.502073988-06	***
20)	4.004006509-06	***
22)	1.713616075-06	***
1)	3.427232150-06	***
8)	7.002622876-07	***
27)	1.262453187-06	***
39)	1.460525775-06	***
24)	2.454266755-06	***
3)	2.804415200-06	***
17)	2.804413200-06	***
42)	2.804418200-06	***
29)	3.504661067-06	***
15)	4.208310622-06	***
30)	4.208310622-06	***
35)	4.208310622-06	***
32)	4.908573509-06	***
34)	5.608836397-06	***
43)	5.608836357-06	***
38)	6.312465334-06	***
41)	7.012728622-06	***
46)	8.416621247-06	***
50)	9.617147221-06	***
25)	1.052077656-05	***
7)	1.367532620-05	***
18)	1.472908718-05	***
6)	1.507921662-05	***
28)	1.993739790-05	***
19)	2.030804031-06	***
36)	1.924657469-05	***
26)	2.563643750-05	***
13)	6.488953628-06	***
14)	1.436272933-05	***
49)	1.037822092-04	***
10)	4.383457456-05	***
16)	7.015216257-05	***
12)	3.321377285-05	***
11)	0.00	***
avg.	5.445396462-06	***
std.	3.341271[illegible]-05	***
min	[illegible]	
max	.02	
total	0.02725	***

total on filter 1196.0 ng

* all data in ng.

Crocidolite

STATISTICS SUMMARY

WAUKEG(LANDFILL W-2-3 D=3.40 M(=4[illegible]00.0

	DIAMETER (MICRONS)	LENGTH (MICRONS)
OBSERVATIONS	1	1
AVERAGE	0.250	9.167
GEOMETRIC MEAN	0.250	9.167
MEDIAN	0.250	9.166
STANDARD DEVIATION	0.000	0.000
MINIMUM	0.250	9.166
MAXIMUM	0.250	9.166

crocidolite

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND ACTUAL MASSES

WAUKEGAN LANDFILL W-2-3 D=3.40 MAG=48000.0

TABLE 1 1 OBSERVATIONS PAGE 1

FIBER NUMBER	DIAMETER (MICRONS)	LENGTH (MICRONS)	ACTUAL MASS (NANOGRAMS)
1	0.250	9.166	~~0.1529E-02~~ $.115 \times 10^{-2}$

50.47 ng / total fiber

FIBER COUNT DATA

RELATIONSHIP(F IAMETERS, LENGTHS, AN(AC.JAL MASSES

WAUKEGAN LANDFILL W-3-3 D=2.55 MAG=48000.0

TABLE 1 48 OBSERVATIONS PAGE 1

Chrysotile

FIBER NUMBER	DIAMETER (MICRONS)	LENGTH (MICRONS)
38	0.016	0.166
26	0.016	0.187
16	0.016	0.625
10	0.016	0.833
42	0.016	0.833
8	0.016	1.041
30	0.020	0.187
37	0.020	0.208
9	0.020	0.250
11	0.020	0.250
32	0.020	0.250
1	0.020	0.416
3	0.020	0.625
15	0.020	1.041
17	0.020	1.250
12	0.020	1.458
25	0.031	0.625
31	0.031	1.458
46	0.037	0.416
36	0.037	1.041
34	0.037	1.250
33	0.037	1.458
40	0.037	2.916
41	0.037	3.750
44	0.041	0.250
29	0.041	0.312
7	0.041	0.625
14	0.041	0.729
43	0.041	0.833
48	0.041	0.833
4	0.041	0.937
28	0.041	1.354
6	0.041	1.458
39	0.041	1.666
45	0.041	1.666
35	0.041	2.083
27	0.041	2.333
19	0.052	0.833
21	0.062	0.833
13	0.062	1.666
18	0.062	1.666
5	0.062	3.541
2	0.072	0.520
47	0.072	2.291
20	0.083	2.083
23	0.104	7.500
22	0.145	6.250
24	0.166	1.250

chrysotile

STATISTICS SUMMARY

WAUKEGAN L[illegible]DFILL W-3-3 D=2.55 MAG=46[illegible]0.0

	DIAMETER (MICRONS)	LENGTH (MICRONS)
OBSERVATIONS	48	48
AVERAGE	0.043	1.376
GEOMETRIC MEAN	0.036	0.922
MEDIAN	0.041	1.041
STANDARD DEVIATION	0.031	1.433
MINIMUM	0.016	0.166
MAXIMUM	0.166	7.500

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND ACTUAL MASSES

WAUKEGAN LANDFILL W-3-3 D=2.55 MAG=48000.0

TABLE 3 48 OBSERVATIONS PAGE 1

Chrysotile
All data
in ng

38)	8.516551492-08	***
26)	9.587638137-08	***
14)	3.204424508-07	***
10)	4.276856984-07	***
42)	4.270356584-07	***
8)	5.337283460-07	***
30)	1.498068457-07	***
37)	1.666300744-07	***
9)	2.002765317-07	***
11)	2.002765317-07	***
32)	2.002765317-07	***
1)	3.332601487-07	***
3)	5.006913293-07	***
13)	8.339514780-07	***
17)	1.001382659-06	***
12)	1.168012733-06	***
25)	1.202910916-06	***
31)	2.806150591-06	***
44)	6.006575077-06	***
36)	2.854138933-06	***
34)	3.427232156-06	***
33)	3.997523578-06	***
40)	7.995047156-06	***
41)	1.028169645-05	***
46)	8.416621247-07	***
39)	1.050394332-06	***
7)	2.104155311-06	***
16)	2.454286755-06	***
43)	2.804416208-06	***
48)	2.804416208-06	***
4)	3.154549642-06	***
28)	4.558442067-06	***
6)	4.908573509-06	***
29)	5.608836397-06	***
45)	5.608836397-06	***
35)	7.012728833-06	***
27)	7.854390348-06	***
19)	4.511092688-05	***
21)	6.412953696-05	***
18)	1.282591736-05	***
5)	2.726064839-05	***
9)	5.398814411-06	***
47)	2.378593641-05	***
20)	2.873925572-05	***
23)	1.624643225-04	***
22)	2.631758799-04	***
24)	6.898525134-05	***

avg.	1.473252484-05	***
std.d.	4.448949987-05	***
min	8.51-08	
max	2.63-04	
total	7.071611923-04	***

total on film 6.206 ng

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND ACTUAL MASSES

WAUKEGAN LANDFILL W-4-3 D=2.55 MAG=48000.0

TABLE 1 52 OBSERVATIONS PAGE 1

FIBER NUMBER	DIAMETER (MICRONS)	LENGTH (MICRONS)
50	0.016	0.145
51	0.016	0.208
20	0.016	0.250
22	0.016	0.375
49	0.016	0.416
12	0.016	0.520
16	0.016	2.083
19	0.016	2.083
41	0.016	2.500
11	0.020	0.312
48	0.020	0.520
7	0.020	0.625
18	0.020	0.625
6	0.020	0.729
3	0.020	0.833
5	0.020	0.833
10	0.020	0.833
45	0.020	1.875
25	0.020	2.083
34	0.020	2.291
42	0.037	0.208
8	0.037	0.625
15	0.037	0.625
28	0.037	0.729
47	0.041	0.229
17	0.041	0.416
4	0.041	0.625
13	0.041	0.625
27	0.041	1.666
44	0.041	2.291
38	0.041	2.604
26	0.041	10.833
14	0.062	0.312
23	0.062	0.375
1	0.062	0.625
31	0.062	0.833
35	0.062	1.041
9	0.062	1.562
36	0.062	2.083
21	0.062	2.291
40	0.062	2.291
43	0.062	2.916
37	0.072	8.333
52	0.083	1.250
2	0.104	0.833
29	0.166	1.666
30	0.166	3.958
32	0.187	2.08

FIBER COUNT DATA

RELATIONSHIP(F DIAMETERS, LENGTHS, AN(AC,DAL MASSES

WAUKEGAN LANDFILL W-4-3 D=2.55 MAG=48000.0

TABLE 1 52 OBSERVATIONS PAGE 2

FIBER NUMBER	DIAMETER (MICRONS)	LENGTH (MICRONS)
24	0.208	3.125
46	0.208	4.375
33	0.208	10.000
39	0.416	12.500

Chrysotile

STATISTICS SUMMARY

WAUKEGAN LANDFILL W-4-3 D=2.55 MAG=46.00.0

	DIAMETER (MICRONS)	LENGTH (MICRONS)
OBSERVATIONS	52	52
AVERAGE	0.064	2.002
GEOMETRIC MEAN	0.043	1.112
MEDIAN	0.041	0.833
STANDARD DEVIATION	0.073	2.681
MINIMUM	0.016	0.145
MAXIMUM	0.416	12.500

FIBER COUNT DATA

RELATIONSHI(OF DIAMETERS, LENGTHS, A(ACTUAL MASSES

WAUKEGAN LANDFILL W-4-3 D=2.55 MAG=48000.0

TABLE 3 52 OBSERVATIONS PAGE 1

Chrysotile

All data in sq.

50)	7.434264859-08	***
51)	1.066432476-07	***
20)	1.281769503-07	***
22)	1.923654705-07	***
49)	2.132664252-07	***
12)	2.665081189-07	***
16)	1.067976000-06	***
19)	1.067570600-06	***
44)	1.281769503-06	***
11)	2.459451115-07	***
48)	4.165751859-07	***
7)	5.005913293-07	***
18)	5.006913293-07	***
6)	5.849063665-07	***
9)	6.673214037-07	***
5)	6.673214037-07	***
10)	6.673214037-07	***
45)	1.502073988-06	***
25)	1.668704663-06	***
34)	1.835334136-06	***
42)	5.702914296-07	***
8)	1.713616075-06	***
15)	1.713616075-06	***
28)	1.998761795-06	***
47)	7.769625061-07	***
17)	1.400525775-06	***
4)	2.104155311-06	***
13)	2.104155311-06	***
27)	5.608836337-06	***
46)	7.712991705-06	***
38)	8.766752669-06	***
24)	3.647090317-05	***
14)	2.401972522-06	***
23)	2.886986205-06	***
1)	4.811643674-06	***
31)	6.415266277-05	***
35)	8.814273702-06	***
9)	1.203525987-05	***
36)	1.603624603-05	***
41)	[illegible]	
40)	1.763756105-05	***
43)	2.244920473-05	***
37)	6.415266277-05	***
52)	1.724631283-05	***
3)	1.604437075-05	***
26)	9.161241376-05	***
30)	2.164345998-04	***
32)	1.458822609-04	***
29)	2.707736708-04	***
41)	3.790834192-04	***
33)	8.664763668-04	***
39)	4.332381925-03	***

avg	1.269038299-04	***
std. d.	6.101306662-04	***
min	7.43-08	
max	4.33-03	
total	0.00660	***
total ex. fiber	574.4	mg

Crocidolite

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND ACTUAL MASSES

WAUKEGAN LANDFILL W-4-3 D=3.4 MAG=48000.0

TABLE 1 8 OBSERVATIONS PAGE 1

FIBER NUMBER	DIAMETER (MICRONS)	LENGTH (MICRONS)
1	0.041	1.770
8	0.041	3.125
2	0.052	1.041
4	0.062	0.625
3	0.104	4.583
7	0.208	7.500
6	0.229	5.208
5	0.416	2.187

STATISTICS SUMMARY

WAUKEGA LANDFILL W-4-3 D=3.4 MAG '80 3.0

	DIAMETER (MICRONS)	LENGTH (MICRONS)
OBSERVATIONS	8	8
AVERAGE	0.145	3.255
GEOMETRIC MEAN	0.102	2.476
MEDIAN	0.104	3.125
STANDARD DEVIATION	0.133	2.354
MINIMUM	0.041	0.625
MAXIMUM	0.416	7.500

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND ACTUAL MASSES

WAUKEGAN LANDFILL W-4-3 D=3.4 MAG=48000.0

TABLE 3 8 OBSERVATIONS PAGE 1

	crocidolite	
	All data in m.	
j)	7.945253456-06	***
i)	1.402770206-05	***
h)	7.516682654-06	***
g)	6.415524899-06	***
f)	1.323687093-04	***
e)	8.664763867-04	***
d)	7.293075990-04	***
c)	1.010658058-03	***
avg	3.466394941-04	***
std. d.	4.407134757-04	***
min	7.94-06	
max	1.01-03	
total	2.774715953-03	***
	243.6	ng/ft.Hr

FIBER COUNT DATA

RELATIONSHIP(F[illegible]AMETERS, LENGTHS, AN(AC[illegible]AL MASSES

WAUKEGAN LANDFILL W-5-3 D=2.55 MAG=48000.0

TABLE 1 19 OBSERVATIONS PAGE 1

chrysotile

FIBER NUMBER	DIAMETER (MICRONS)	LENGTH (MICRONS)
2	0.012	0.208
1	0.016	0.250
4	0.020	0.187
16	0.020	0.833
14	0.020	1.666
12	0.037	1.041
11	0.041	0.312
5	0.041	0.375
3	0.041	0.625
15	0.041	0.625
17	0.041	1.041
8	0.062	1.250
6	0.062	1.666
9	0.062	1.875
7	0.072	0.729
10	0.083	4.166
13	0.083	7.083
19	0.093	1.875
18	0.125	1.041

STATISTICS SUMMARY

WAUKEGAN LANDFILL W-5-3 D=2.55 MAG=400.0

Observable

	DIAMETER (MICRONS)	LENGTH (MICRONS)
OBSERVATIONS	19	19
AVERAGE	0.052	1.413
GEOMETRIC MEAN	0.043	0.891
MEDIAN	0.041	1.041
STANDARD DEVIATION	0.030	1.656
MINIMUM	0.012	0.187
MAXIMUM	0.125	7.083

FIBER COUNT DATA

RELATIONSHIP OF DIAMETERS, LENGTHS, AND ACTUAL MASSES.

WAUKEGAN LANDFILL W-5-3 D=2.55 MAG=48000.0

TABLE 3 19 OBSERVATIONS PAGE 1

Chrysotile

All data in ng.

2)	5.958852674-08	***
1)	1.281769607-07	***
4)	1.498058457-07	***
16)	6.673214037-07	***
14)	1.334642807-06	***
12)	2.854196935-06	***
11)	1.050394332-06	***
5)	1.262493187-06	***
3)	2.104155311-06	***
15)	2.104155311-06	***
17)	3.504681087-06	***
8)	9.623287346-06	***
6)	1.282551738-05	***
9)	1.443493102-05	***
7)	7.568722509-06	***
10)	5.747851141-05	***
13)	9.772450706-05	***
18)	3.247859479-05	***
19)	3.257822960-05	***
avg	1.4733.3548-05	***
std.d.	2.516900126-05	***
min	5.9-09	
max	9.77-05	
total	2.799307142-04	***

total on filter 2.457 ng/filter

Johns-Manville
Sales Corporation

Waukegan, Illinois 60087
(312) 623-2900

June 20, 1983

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Basil G. Constantelos, Director
Waste Management Division
United States Environmental
Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Re: Request For Information Concerning
Waste Disposal Practices At
Johns-Manville Facility, Waukegan, Illinois

Dear Mr. Constantelos:

On April 7, 1983, Johns-Manville Sales Corporation ("Johns-Manville") provided you with information you had requested concerning certain waste disposal practices at the facility in Waukegan, Illinois which is owned and operated by Johns-Manville.

At that time, Johns-Manville commented on the test results obtained from the air sampling for asbestos conducted at the Waukegan facility's on-site disposal area on April 28, 1982 by the Ecology and Environment Incorporated, under contract to USEPA (the "USEPA Test Results"). Johns-Manville also noted that, in addition to providing those comments to the United States Environmental Protection Agency ("USEPA"), Johns-Manville was in the process of further evaluating the USEPA Test Results by independently testing the portion provided to Johns-Manville of the air samples taken by the Ecology and Environment Incorporated on April 28, 1982. Johns-Manville now has the results of that testing and hereby supplements its April 7, 1983 response with the information set forth below.

Analysis of USEPA Test Results

On April 18, 1982, Ecology and Environmental, Incorporated sampled three locations (upwind, midsite, downwind) at the Waukegan facility's on-site disposal area. Three Sierra Virtual Impactors were used to collect the samples. Each sampling device used two filters, which are designated as coarse and fine because of the particle separation which is supposed

to occur. Portions of five of the six filters sampled by Ecology and Environmental, Incorporated in 1982 were provided to Johns-Manville for evaluation. The sample data for six filters; upwind fine, midpoint coarse, midpoint fine, downwind coarse, downwind fine, and a blank are presented here. Data for the upwind coarse sample, which was considered damaged at the time the sample was taken and not provided to Johns-Manville are thus not available.

The data from the evaluation of the portions of the filters retained by Ecology and Environmental, Incorporated have been provided by USEPA. These data are summarized in Table I. An evaluation of the damaged upwind coarse filter was reported by USEPA and is included in all summaries in this report.

The filter samples given to Johns-Manville have been evaluated by the company TEM laboratory. The protocol followed by the Johns-Manville TEM Laboratory included:

-- USEPA recommended methodology for preparation and counting.

— Carbon coated Au grids (98.7 um grid opening/area = 0.00974mm^2).

— Sample scanned at 20,000X to locate fibers; fibers were measured at 48,000X.

— Grids to be counted were randomly selected at 220X.

— Because of time constraints, a maximum of 10 grid openings were counted and measured.

— Fibers were identified by electron diffraction and EDS.

— Clumps (restricted fibers) were counted separately (they are not measured.)

— Cutouts with areas of 3-mm^2 of the original filters were used in grid preparation.

A summary of the sample data from the Johns-Manville TEM Laboratory is given in Table II. The detailed printouts for the individual filters are also attached as Appendix A. The data from Tables I and II are not comparable, since the Johns-Manville Laboratory was asked to do a blind evaluation and was not given the air volumes filtered through each filter. The Total Filter Area Fibers, clumps, bundles, and mass are therefore given in Table II.

The data from Tables I and II have been used to make the calculations necessary to compare the USEPA and Johns-Manville TEM Laboratory evaluation. Tables III and IV contain the fiber count and mass estimates, respectively, from the USEPA and Johns-Manville TEM, Laboratory reports. For example, the fiber counts taken from Table II and the total air filtered from Table I are used to calculate the fibers per cubic centimeter in Table III.

The individual filter data are provided in Tables III and IV primarily to illustrate the fiber distributions on those filters. The ambient levels are estimated by combining the individual filter estimates using weights proportional to the air drawn through those filters.

Perusal of Tables III and IV illustrates the well-known interlaboratory-intrafilter variation which is associated with TEM evaluation of split samples. For example, Steel et al (NBS Special Publication 619 - Issued March, 1982) noted:

> Measurement of asbestos in the ambient environment is currently accomplished using a filter collection procedure followed by an analytical electron microscope (AEM) analysis. A 1977 multilaboratory study of ambient air samples using unspecified preparation and counting methods gave results on split samples that varied by several orders of magnitude (1). Since that time the Environmental Protection Agency (EPA) has been developing a standard methodology, but even using these techniques and the most experienced laboratories, interlaboratory results generally vary by a factor of two or more (2-4).

Statistically valid estimates of ambient levels of fibers per cubic centimeter or nanograms per cubic meter of air can be obtained only by using information from both filters when a dichotomous sampler is used. The concentrations estimated from the air passing through the individual filters must be combined using weights proportional to the volumes of air sampled by each filter. For example, from Table I the downwind coarse and fine filters "sampled" 0.752 and 6.8 cubic meters of air, respectively. USEPA estimates were 21.0 fibers per cubic centimeter for the downwind coarse filter and "below detection limit" (no fibers were counted, giving a zero estimate) for the downwind fine filter, from Table III. The statistically valid estimate is thus calculated by

$$\frac{(0.752)(21.0) + (6.8)(0)}{(0.752 + 6.8)}$$

which rounds to 2.1 fibers per cubic centimeter. Similar calculations were made to give the remaining ambient estimates in Tables III and IV.

Are the ambient estimates in Tables II and IV consistent with ambient levels from other studies? Gibbs, Rowlands, and Brulotte reported on a pilot study on the measurement of airborne asbestos fibre concentrations in ambient air. The data from the control site in that study gives:

> Fibers per cubic centimeter: 0.03, 0.05, 0.1, 1.9, 3.3, 4.0, 4.8, and 7.0
>
> Nanograms per cubic meter: 1, 1, 3, 6, 14, 20, 26, and 240

The downwind USEPA and Johns-Manville ambient estimates are 2.1 and 0.5 fibers per cubic centimeter (Table III), respectively, and 189 and 24 nanograms per cubic meter (Table IV), respectively. Those estimates are clearly within the range of the Gibbs et al control site sample results. Thus, both the USEPA and Johns-Manville estimates cannot be considered significantly different from ambient levels by even an informal assessment. The lack of standard sampling and analytical procedures and limited data available prescribe a more formal analysis of the 1982 samples.

A great deal of attention has been given to the downwind coarse filter, because it represents the highest individual filter estimate and contributes to the downwind ambient estimate. The USEPA single filter value of 21 was based on two fields, which was 0.015 mm^2 of the filter. The Johns-Manville single filter value of 4.8 was based on five fields, or 0.0487 mm^2 of the filter. The USEPA counts were done at 20,000X and the Johns-Manville counts were done at 48,000X.

Assuming both sets of analytical tests were conducted in accordance with good laboratory practice, somewhat more confidence can be given to the Johns-Manville estimate simply because of a larger magnification (48,000X vs 20,00X) was used and a larger portion of the filter was evaluated (0.0487 mm^2 vs. 0.015 mm^2). The two laboratory results (it is noted earlier that the differences are well within expected interlaboratory variation) combined give confidence that a complete evaluation of the filter would not be larger. When those single filter results are used with the downwind fine sample to give statistically valid estimates of the ambient measurements, <u>both</u> laboratory results are within the range of reported levels in control areas.

Notarization and Attestation

This document is signed by Richard B. Von Wald solely to satisfy USEPA's request for attestation as set forth in USEPA's letter of February 7, 1983 to Johns-Manville. The information provided herein is based on documents and test results presently available to Johns-Manville and is correct to the best of Johns-Manville's current knowledge, information, and belief. Johns-Manville reserves the right to supplement this response should new or different information become available.

Sincerely,

By _____
Richard B. Von Wald
Corporate Counsel

cc: Mr. Norman Niedergang
Mr. Kevin M. Pierard
Mr. Peter McCumiskey
Mr. Bradley P. Benning